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Preliminary ICP-MS analysis of uranium and other trace elements in olivine and muscovite

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Natural minerals have recently gained attention as potential detectors for neutrinos, dark matter, and other unknown particles. However, radioactive elements such as uranium can generate neutrons, alpha recoil, and fission tracks, contributing to background noise. To minimize such interference, minerals with extremely low uranium concentrations are considered ideal candidates. This study aims to evaluate uranium concentrations in olivine and muscovite to assess their suitability for mineral detection of neutrinos, dark matter, and other particles. We analyzed trace elements, including uranium, in hand-picked olivine from harzburgite (Tonga Trench), lherzolite (Mariana Trench), pallasite meteorite, and xenolith in kimberlite (Kimberley, South Africa) and basalt (Damapin, China), as well as muscovite from a pegmatite deposit (Minas Gerais, Brazil). The samples underwent acid digestion, and their trace element compositions were determined using ICP-MS (Agilent 7700x) at Nagoya University. Our results show that uranium concentrations in olivine range from 0.09 to 49.2 ng/g, while muscovite contains 1.8 ng/g. These results indicate that it is essential to account for potential background signals arising from uranium concentrations on the order of 10 ng/g in mineral detection. Therefore, precise quantification of uranium is essential when selecting minerals for particle detection.

Do you plan to give the talk in person?

Yes

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